WHAT IS CLAIMED IS:

1. A wavelength router for receiving, at an input port, light having a plurality of spectral bands and directing subsets of said spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

a free-space optical train disposed between the input ports and said output ports providing optical paths for routing the spectral bands, the optical train including a dispersive element disposed to intercept light traveling from the input port, said optical train being configured so that light encounters said dispersive element twice before reaching any of the output ports; and

a routing mechanism having at least one dynamically configurable routing element to direct a given spectral band to different output ports, depending on a state of said dynamically configurable element.

2. The wavelength router of claim 1 wherein said input port is located at the end of an input fiber.

3. The wavelength router of claim 1 wherein said output ports are located at respective ends of a plurality of output fibers.

4. The wavelength router of claim 1 wherein said routing mechanism has a configuration that directs at least two spectral bands to a single output port.

5. The wavelength router of claim 1 wherein said routing mechanism has a configuration that results in at least one output port receiving no spectral bands.

6. The wavelength router of claim 1 wherein the number of spectral bands is greater than the number of output ports, and the number of output ports is greater than 2.

7. The wavelength router of claim 1 wherein said routing mechanism includes a plurality of reflecting elements, each associated with a respective one of the spectral bands.

8. The wavelength router of claim 1 wherein said dynamically configurable element has a translational degree of freedom.

9. The wavelength router of claim 1 wherein said dynamically configurable element has a rotational degree of freedom.

10. The wavelength router of claim 1 wherein:

said dispersion element is a grating; and

said optical train includes optical power incorporated into said grating.

11. The wavelength router of claim 1 wherein:

said optical train includes a lens;

said dispersive element is a reflection grating;

said routing mechanism includes a plurality of dynamically configurable elements;

light coming from said input port is collimated by said lens and is reflected from said reflection grating as a plurality of angularly separated beams corresponding to said spectral bands;

said angularly separated beams are focused by said lens on respective ones of said dynamically configurable elements; and

each given dynamically configurable element has a plurality of states, each adapted to direct that dynamically configurable element's respective angularly separated beam along a desired one of a plurality of paths such that light leaving that dynamically configurable element is again collimated by said lens, reflected by said reflection grating, and again focused by said lens on one of said output ports corresponding to the desired one of said plurality of paths.

12. A wavelength router for receiving light having a first number, N, of spectral bands at an input port and directing subsets of said N spectral bands to respective ones of a second number, M, of output ports, the wavelength router comprising:

a free-space optical train disposed between the input ports and said output ports providing optical paths for routing the spectral bands, the optical train including a dispersive element disposed to intercept light traveling from the input port, said optical train being configured so that light encounters said grating element twice before reaching any of the output ports; and

wherein M is greater than 2.

13. The wavelength router of claim 12 wherein said dispersive element is a reflection grating, and the optical train includes:

a lens disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward said reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light along a path, with each spectral band being focused at a different point; and

a plurality of N reflecting elements disposed to intercept respective focused spectral bands and direct the same so as to encounter said lens, said reflection grating, said lens, and respective output ports.

14. The wavelength router of claim 12 wherein said dispersive element is a transmission grating, and the optical train includes:

a lens disposed between said transmission grating and the input port; and

a plurality of N reflecting elements on a side of said transmission grating that is remote from said input port so as to cause light passing through said grating and falling on said reflecting elements to pass through said transmission grating, said lens and said the output ports.

15. The wavelength router of claim 12 wherein said dispersive element is a reflection grating, and the optical train includes:

a curved reflector disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward said reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light along a path, with each spectral band being focused at a different point; and

a plurality of N reflecting elements disposed to intercept respective focused spectral bands and direct the same so as to encounter said curved reflector, said reflection grating, said curved reflector, and respective output ports.

16. The wavelength router of claim 12 wherein said dispersive element is a prism.

17. The wavelength router of claim 12 wherein said optical path includes mirrors made from micro-electro-mechanical system (MEMS) elements.

18. A wavelength router for receiving light having a first number, N, of spectral bands at an input port and directing subsets of said N spectral bands to respective ones of a second number, M, of output ports, the wavelength router comprising:

a first cylindrical lens for collimating light emanating from the input port in a first transverse dimension;

a second cylindrical lens for collimating the light in a second transverse dimension that is orthogonal to said first transverse dimension;

a transmissive dispersive element for dispersing the light in said first transverse dimension in a particular sense;

a third cylindrical lens for focusing the light in the first transverse dimension;

a plurality of N tiltable mirrors in the focal plane of said third cylindrical lens, each intercepting a respective spectral band and directing that spectral band back toward said third cylindrical lens; and

a plurality of actuators, each coupled to a respective mirror to effect selective tilting of the light path of the respective spectral band;

wherein each spectral band is collimated in the first transverse dimension by said third cylindrical lens, dispersed in the first transverse dimension by the grating in a sense opposite the particular sense, focused in the second transverse dimension by said second cylindrical lens and focused in the first transverse dimension by said first cylindrical lens, whereupon each spectral band is brought to a focus in both the first and second transverse dimensions at a respective position determined by the respective tiltable mirror.

19. The wavelength router of claim 18, and further comprising an array of output fibers positioned to receive light from said return path, whose positions correspond to the tilts of said plurality of tiltable mirrors in a Fourier relationship through said second cylindrical lens.

20. The wavelength router of claim 18 wherein said mirrors are made from micro-electro-mechanical system (MEMS) elements.

21. A wavelength router for receiving light having a first number, N, of spectral bands at an input port and directing subsets of said N spectral bands to respective ones of a second number, M, of output ports, the wavelength router comprising:

a first spherical lens for collimating light emanating from the input port;

a transmissive dispersive element for dispersing the light in a first transverse dimension in a particular sense to spatially separate the spectral bands;

a second spherical lens for focusing the light traveling from said dispersive element; and

a plurality of retroreflectors in the focal plane of said second spherical lens, each retroreflector intercepting a respective spectral band and directing that spectral band back toward said second spherical lens with a transverse displacement in a second transverse dimension that is orthogonal to the first transverse dimension, said transverse displacement depending on a state of that retroreflector;

wherein each spectral band is collimated by said second spherical lens, dispersed in the first transverse dimension by the grating in a sense opposite the particular sense, focused by said first spherical lens, whereupon each spectral band is brought to a focus at a respective position determined by the respective retroreflector.

22. A wavelength router for receiving light having a first number, N, of spectral bands at an input port and directing subsets of said N spectral bands to respective ones of a second number, M, of output ports, the wavelength router comprising:

an optical element with positive optical power disposed to collimate light emanating from the input port;

a reflective dispersive element for dispersing the light traveling from said optical element in a first transverse dimension in a particular sense to spatially separate the spectral bands, said dispersive element directing the spectral bands back to said optical element, which focuses the light traveling from said dispersive element; and

a plurality of retroreflectors in the focal plane of said optical element, each retroreflector intercepting a respective spectral band and directing that spectral band back toward said optical element with a transverse displacement in a second transverse dimension that is orthogonal to the first transverse dimension, said transverse displacement depending on a state of that retroreflector;

wherein each spectral band is collimated by said optical element, dispersed in the first transverse dimension by said dispersive element in a sense opposite the particular sense, focused by said optical element, whereupon each spectral band is brought to a focus at a respective position determined by the respective retroreflector.

23. The wavelength router of claim 22 wherein said optical element is a spherical lens.

24. The wavelength router of claim 22 wherein said optical element is a concave reflector.

25. The wavelength router of claim 22 wherein:

each retroreflector includes a rooftop prism; and

the state of that retroreflector is defined by a transverse position of that retroreflector's rooftop prism.

26. The wavelength router of claim 22 wherein:

each retroreflector includes a rooftop prism and a relatively movable associated body of transparent material configured for optical contact with that retroreflector's rooftop prism; and

the state of that retroreflector is defined at least in part by whether that retroreflector's rooftop prism is in optical contact with its associated body.

27. A method of making an array of rooftop prisms, the method comprising:

providing an elongate prism element;

providing a pair of elongate stop elements that have surfaces possessing a desired degree of flatness;

optically polishing surfaces of the elongate prism element to a desired degree of flatness;

subjecting the elongate prism element, thus optically polished, to a set of operations that provide the plurality of rooftop prisms that make up the array; and

providing respective positioning elements to the array of rooftop prisms for movement between the pair of elongate stop elements.

28. The method of claim 27 wherein:

the elongate prism element is a unitary component; and

the set of operations includes physically cutting the elongate prism element into individual prisms.

29. The method of claim 27 wherein:

the elongate prism element is a bonded component of individual prisms; and

the set of operations includes breaking the bonds between individual prism.

30. A dynamically configurable retroreflector comprising:

first and second flat mirrors, fixed at a particular included angle with respect to one another, said first and second flat mirrors defining an intersection axis;

a third flat mirror mounted for rotation about a rotation axis parallel to said intersection axis; and

an actuator coupled to said third flat mirror configured to provide first and second angular positions about said rotation axis, said first angular position being such to define an included angle of approximately 90° between said first and third flat mirrors, said second angular position being such to define an included angle of approximately 90° between said second and third flat mirrors.

31. A configurable retroreflector array comprising:

a support element having first and second mounting surfaces lying in planes defining an angle therebetween of approximately 90°.

first and second MEMS micromirror arrays disposed on respective first and second substrates, mounted to said first and second mounting surfaces of said support element;

a given micromirror in said first array being associated with a plurality of M micromirrors in said second array; and

an actuator coupled to each given micromirror in said first array to provide M discrete orientations of said given micromirror, each orientation directing light along an incident direction toward a different micromirror in said second array;

said plurality of M micromirrors in said second array having respective orientations such that each respective orientation is substantially 90° to the orientation of

the given mirror in said first array when the given mirror is oriented to direct light to that micromirror in said second array.

32. The configurable retroreflector array of claim 31 wherein:

said support element is a V-block having support surfaces facing toward each other; and

said first and second arrays are mounted with said first and second substrates disposed between the micromirrors in the arrays and said first and second mounting surfaces.

33. The configurable retroreflector array of claim 31 wherein:

said support element is a prism having support surfaces facing away from each other; and

said first and second arrays are mounted with the micromirrors in the arrays disposed between said first and second substrates and said first and second mounting surfaces.

34. The configurable retroreflector array of claim 31 wherein the micromirrors are limited to deflections on the order of ±10°.

35. A wavelength add-drop multiplexer comprising:.

first and second wavelength routers according to claim 1, connected in opposite directions with a first subset of the first wavelength router's output ports in optical communication with a corresponding first subset of the second wavelength router's output ports, said first wavelength router's input port being in optical communication with an upstream fiber, said second wavelength router's input port being in optical communication with downstream fiber, and respective second subsets of said first and second wavelength routers' output ports being in communication with network terminal equipment for receiving light from one of the second subsets of output ports and communicating light onto the other of the second subsets of output ports.

36. The wavelength router of claim 1 wherein said dispersive element is a grating having a resolution significantly less than a separation between spectral bands.

37. The wavelength router of claim 36 wherein the resolution is achieved by a differential path length greater than about 3 cm.